

Applicant : William James Moore et al.
Serial No. : 10/713,833
Filed : November 14, 2003
For : Alkaline Electrochemical Cell

Art Unit : 1745
Examiner : Ben Lewis

CLAIM AMENDMENTS

Please cancel claims 17-23.

1. (currently amended) An electrochemical cell, comprising:
 - a) a container housing a first electrode, said electrode defining a cavity therein;
 - b) a separator lining said cavity and abutting said first electrode;
 - c) a second electrode disposed within said separator lined cavity, said second electrode having a known volume and less than 50 ppm of mercury, said second electrode comprises zinc powder having a tap density greater than 2.80 g/cc and less than 3.65 g/cc, said zinc powder occupies less than 28.0 volume percent of said second electrode's volume and said zinc powder has a BET specific surface area greater than 400 cm²/g; and
 - d) a quantity of alkaline electrolyte disposed within said container and in contact with said electrodes and said separator.
2. (original) The electrochemical cell of claim 1, wherein the volume of zinc is no greater than 27.0% of the second electrode's volume.
3. (original) The electrochemical cell of claim 1, wherein the volume of zinc is no greater than 26.0% of the second electrode's volume.
4. (original) The electrochemical cell of claim 1, wherein the volume of zinc is no greater than 24.0% of the second electrode's volume
5. (original) The electrochemical cell of claim 1, wherein the second electrode comprises a gelling agent, said gelling agent comprises an absorbed quantity of an aqueous alkaline solution, said solution comprises no more than 36% by weight potassium hydroxide.
6. (original) The electrochemical cell of claim 5, wherein said solution comprises no more than 34% by weight potassium hydroxide.
7. (original) The electrochemical cell of claim 5, wherein said solution comprises no more than 32% by weight potassium hydroxide.
8. (original) The electrochemical cell of claim 5 wherein said second electrode has a resistivity value less than 4 mΩ-cm.

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9. (currently amended) The electrochemical cell of claim 1 wherein said particulate zinc has ~~a BET specific surface area greater than 400 cm²/g,~~ a KOH absorption value of at least 14%, and a D₅₀ less than 130 microns.
10. (original) The electrochemical cell of claim 1 wherein said tap density is greater than 2.90 g/cc and less than 3.55 g/cc.
11. (original) The electrochemical cell of claim 1 wherein said tap density is greater than 3.00 g/cc and less than 3.45 g/cc.
12. (original) The electrochemical cell of claim 9, wherein said BET specific surface area is greater than 450 cm²/g.
13. (original) The electrochemical cell of claim 9, wherein said KOH absorption value is at least 15%.
14. (original) The electrochemical cell of claim 9 wherein said D₅₀ is between 100 and 130 microns.
15. (original) The electrochemical cell of claim 14, wherein said D₅₀ is between 110 and 120 microns.
16. (original) The electrochemical cell of claim 1 wherein said particulate zinc is a zinc alloy comprising bismuth between 75 ppm and 125 ppm, indium between 175 ppm and 225 ppm, and aluminum between 75 ppm and 125 ppm.
17. to 23. (cancelled)
24. (currently amended) An LR6 size electrochemical cell, comprising:
 - a) a cylindrical container housing a first electrode defining a centrally located cavity therein;
 - b) a second electrode having less than 50 ppm of mercury and disposed within said cavity, said second electrode comprising no more than 4.3 grams of zinc powder having a tap density between 2.80 g/cc and 3.65 g/cc and a BET specific surface area greater than 400 cm²/g;
 - c) a separator located between said electrodes; and
 - d) a quantity of alkaline electrolyte in contact with said electrodes and separator;

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wherein said cell, if discharged at 250 milliamps constant current for one hour per day, would have a minimum closed circuit voltage of 0.90 volts for at least 538 total accumulated minutes.

25. (original) The electrochemical cell of claim 24, wherein said cell, if discharged across a 43 ohm resistor for four hours per day, would have a minimum closed circuit voltage of 0.9 volts for at least 100 total accumulated hours.
26. (original) The electrochemical cell of claim 24 wherein said second electrode comprises a gelling agent, said gelling agent comprises an absorbed quantity of an aqueous solution, said solution comprises no more than 36% by weight KOH.
27. (original) The electrochemical cell of claim 26, wherein said second electrode comprises, in addition to said zinc powder, an aqueous solution having no more than 33 weight percent potassium hydroxide, said weight percent of potassium hydroxide based on the total quantities of water and potassium hydroxide in said second electrode just prior to disposing the second electrode into said container.
28. (original) The electrochemical cell of claim 27, wherein said potassium hydroxide in said second electrode's aqueous solution is less than 32 weight percent.
29. (original) The electrochemical cell of claim 28, wherein said potassium hydroxide in said second electrode's aqueous solution is no more than 31 weight percent.
30. (currently amended) An LR6 electrochemical cell, comprising:
 - a. a cylindrical container housing a first electrode defining a centrally located cavity therein;
 - b. a second electrode disposed within said cavity, said second electrode comprising no more than 4.3 grams of zinc powder having a tap density between 2.80 g/cc and 3.65 g/cc, a BET specific surface area greater than 400 cm²/g and less than 50 ppm of mercury;
 - c. a separator located between said electrodes; and
 - d. a quantity of electrolyte in contact with said electrodes and separator;wherein said cell, if discharged across a 43 ohm resistor for four hours per day, would have a minimum closed circuit voltage of 0.9 volts for at least 100 total accumulated hours.

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31. (currently amended) The electrochemical ~~cells~~cell of claim 30, wherein said cell, if continuously discharged at a rate of one watt, would have a minimum closed circuit voltage of 1.0 volts for at least 58 minutes.
32. (original) The electrochemical cell of claim 30, wherein said second electrode comprises, in addition to said zinc powder, an aqueous solution having no more than 33 weight percent potassium hydroxide, said weight percentage of potassium hydroxide based on the total quantities of water and potassium hydroxide in said second electrode just prior to disposing the second electrode into said container.
33. (currently amended) The electrochemical ~~cells~~cell of claim 32, wherein said potassium hydroxide in said second electrode's aqueous solution is less than 32 weight percent.
34. (currently amended) The electrochemical ~~cells~~cell of claim 33, wherein said potassium hydroxide in said second electrode's aqueous solution is no more than 31 weight percent.
35. (currently amended) An LR6 electrochemical cell, comprising:
- a) a cylindrical container housing a first electrode defining a centrally located cavity therein;
 - b) a second electrode disposed within said cavity and having less than 50 ppm of added mercury, said second electrode comprising no more than 4.3 grams of zinc powder having a tap density between 2.80 g/cc and 3.65 g/cc and a specific surface area greater than 400 cm²/g;
 - c) a separator located between said electrodes; and
 - d) a quantity of electrolyte in contact with said electrodes and separator;
- wherein said cell, if continuously discharged at a rate of one watt, would have a minimum closed circuit voltage of 1.0 volts for at least 58 minutes.
36. (currently amended) The electrochemical cell of claim 35, wherein said cell, if discharged at 250 ~~millamps~~milliamps constant current for one hour per day, would have a minimum closed circuit voltage of 0.90 volts for at least 538 total accumulated minutes.
37. (original) The electrochemical cell of claim 35, wherein said second electrode comprises, in addition to said particulate zinc, an aqueous solution having no more than 33 weight percent potassium hydroxide, said weight percentage of potassium hydroxide based on

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the total quantities of water and potassium hydroxide in said second electrode just prior to disposing the second electrode into said container.

38. (original) The electrochemical cell of claim 37, wherein said potassium hydroxide in said second electrode's aqueous solution is less than 32 weight percent.
39. (original) The electrochemical cell of claim 38, wherein said potassium hydroxide in said second electrode's aqueous solution is no more than 31 weight percent.
40. (original) An electrochemical cell, comprising:
- a) a container housing a first electrode, said electrode defining a cavity therein;
 - b) a separator lining said cavity and abutting said first electrode;
 - c) a second electrode comprising zinc powder and disposed within said separator lined cavity, said zinc powder having a tap density greater than 2.80 g/cc and less than 3.65g/cc, a BET surface area greater than 400 cm²/g, a KOH absorption value of at least 14%, and a D₅₀ less than 130 microns; and
 - d) a quantity of alkaline electrolyte disposed within said container and in contact with said electrodes and said separator.
41. (original) The electrochemical cell of claim 40 wherein said tap density is greater than 2.90 g/cc and less than 3.55 g/cc.
42. (original) The electrochemical cell of claim 41 wherein said tap density is greater than 3.0 g/cc and less than 3.45 g/cc.
43. (original) The electrochemical cell of claim 40, wherein said BET specific surface area is greater than 450 cm²/g.
44. (original) The electrochemical cell of claim 40, wherein said KOH absorption value is at least 15%.
45. (original) The electrochemical cell of claim 40 wherein said D₅₀ is between 100 and 130 microns.
46. (original) The electrochemical cell of claim 45, wherein said D₅₀ is between 110 and 120 microns.
47. (original) The electrochemical cell of claim 40 wherein said zinc powder is a zinc alloy comprising bismuth between 75 ppm and 125 ppm, indium between 175 ppm and 225 ppm, and aluminum between 75 ppm and 125 ppm.